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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,249	06/25/2003	Gregory A. Merkel	SP03-071	4924
22928	7590	03/08/2005	EXAMINER	
CORNING INCORPORATED			GREENE, JASON M	
SP-TI-3-1			ART UNIT	
CORNING, NY 14831			PAPER NUMBER	

1724

DATE MAILED: 03/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/607,249

Applicant(s)

MERKEL ET AL.

Examiner

Jason M. Greene

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-73 is/are pending in the application.
- 4a) Of the above claim(s) 51-73 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 20-50 is/are rejected.
- 7) ☒ Claim(s) 15-19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 8/27/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-50 in the reply filed on 17 December 2004 is acknowledged.

Drawings

2. The drawings are objected to under 37 CFR 1.84(u)(1) because the view numbers are not preceded by the abbreviation "FIG.". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If

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the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-7, 9, 10, 12-14 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Published International Application WO 02/41972 A1.

With regard to claims 1, 2, 4, 5, 7, 9, 10 and 14, WO 02/41972 A1 discloses a diesel particulate filter comprising a plugged wall-flow honeycomb ceramic body composed of cordierite and having a plurality of parallel end-plugged cell channels traversing the body from a frontal inlet end to an outlet end thereof, wherein the filter exhibits a CTE (25-800 °C) of $1.0 \times 10^{-6}/^{\circ}\text{C}$ ($10 \times 10^{-7}/^{\circ}\text{C}$) or less, a median pore diameter d_{50} of 16-25 μm , a porosity of 50-75%, and a pore size distribution such that the volume of pores with a size of 10 μm is 15% or less of the total pore volume and the volume of pores with a size of 50 μm or larger is 10% or more of the total pore volume in page 6,

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line 10 to page 7, line 12 and Table 3 of the English language translation provided by Applicants in the Information Disclosure Statement filed on 23 August 2003.

With regard to the bulk filter density, WO 02/41972 teaches cordierite having a specific gravity of 2.52 g/cm^3 and the honeycomb filter having a wall thickness of $300 \text{ }\mu\text{m}$ (0.030 cm) and cell number of 300 cells per inch^2 ($46.5 \text{ cells per cm}^2$) in page 11, lines 1-3 and page 12, lines 13-14. From the cell number, the number of cell walls per square cm can be calculated as $2 * (46.5 \text{ cells per cm}^2)^{1/2} = 13.64$. From the specific gravity of cordierite and using a porosity of 57%, the density can be calculated as $13.64 \text{ cell walls/cm}^2 * 0.030 \text{ cm} * 1 \text{ cm length} * 2.52 \text{ g/cm}^3 * 57\% \text{ porosity} = 0.588 \text{ g/cm}^3$, which is less than 0.60 g/cm^3 .

WO 02/41972 does not explicitly disclose the honeycomb filter satisfying the relationship for P_m recited in claim 1. Nor can the value of P_m be calculated from the disclosed data. However, the recited relationship is within the scope of the WO 02/41972 disclosure. Specifically, as noted above, WO 02/41972 teaches the volume of pores with a size of $10 \text{ }\mu\text{m}$ being 15% or less of the total pore volume. Within this teaching is a volume of pores with a size of $10 \text{ }\mu\text{m}$ being 10% or less of the total pore volume. Therefore, a $d_{10} = 10 \text{ }\mu\text{m}$ is within the teaching of WO 02/41972. As also noted above, WO 02/41972 teaches the volume of pores with a size of $50 \text{ }\mu\text{m}$ or larger is 10% or more of the total pore volume. This corresponds to $d_{90} = 50 \text{ }\mu\text{m}$. Thus substituting the values of $d_{10} = 10 \text{ }\mu\text{m}$, $d_{50} = 16 \text{ }\mu\text{m}$, $d_{90} = 50 \text{ }\mu\text{m}$, and porosity = 57 percent into the recited equation, the value of P_m can be calculated to be 3.42.

With regard to claims 3 and 6, the prior art range for the CTE of $10 \times 10^{-7}/^{\circ}\text{C}$ or lower disclosed in WO 02/41972 is seen as overlapping the claimed ranges of less than $7 \times 10^{-7}/^{\circ}\text{C}$ and greater than $4 \times 10^{-7}/^{\circ}\text{C}$ and less than $7 \times 10^{-7}/^{\circ}\text{C}$. Therefore, a prima facie case of obviousness exists which must be overcome through a showing of unobvious or unexpected results.

With regard to claims 12 and 13, substituting the values of $d_{10} = 10 \mu\text{m}$, $d_{50} = 16$ into the recited equation yields $(d_{50} - d_{10})/d_{50} = (16 \mu\text{m} - 10 \mu\text{m}) / 16 \mu\text{m} = 0.375$, which is not greater than 0.50 or 0.45.

With regard to claims 20-22, while WO 02/41972 is silent as to the modulus of rupture exhibited by the filter, the honeycomb filters will inherently possess the recited modulus of rupture since the filters recited in the WO 02/41972 reference are formed from the same material (cordierite) and have the same CTE, bulk filter density, median pore diameter and pore size distribution as the instantly claimed filter.

5. Claims 8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Published International Application WO 02/41972 A1 in view of Published International Application WO 01/91882 A1.

WO 02/41972 does not teach the filter of claim 1 wherein the filter has a bulk density of less than 0.60 g/cm^3 , a porosity not less than 59% and a value of P_m less than or equal to 3.30. Specifically, for a porosity of 59%, the bulk filter density can be

calculated to be 0.608 and P_m can be calculated as 3.325. Similarly, for a porosity of 60%, the bulk filter density can be calculated to be 0.619 and P_m can be calculated as 3.28. While a porosity of 60% satisfies the recited porosity and value of P_m requirements, the resulting bulk filter density is higher than the recited range.

WO 01/91882 A1 teaches a similar honeycomb filter having a wall thickness of 0.0114 inches (0.028956 cm) in Example B2 in Table B on page 22. Using this wall thickness instead of the 0.030 cm wall thickness disclosed by WO 02/41972 results in a bulk filter density of 0.597 g/cm³, which is less than 0.60 g/cm³.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the slightly thinner walls of WO 01/91882 into the honeycomb filter of WO 02/41972 to reduce the pressure drop across the filter by reducing the distance the gas to be filter has to travel through the filter wall.

6. Claims 23-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Published International Application WO 02/41972 A1 in view of Published International Application WO 01/91882 A1.

With regard to claims 23-28, 30, 31, 33-37, 39, 40, 42-46, 48 and 49, WO 02/41972 discloses a ceramic filter for trapping and combusting diesel exhaust particulates comprising an end-plugged porous cordierite honeycomb structure, wherein the filter has a CTE (25-800 °C) of $1.0 \times 10^{-6}/^{\circ}\text{C}$ ($10 \times 10^{-7}/^{\circ}\text{C}$) or less and a bulk filter density of 0.588 g/cm³ for a porosity of 57% in page 6, line 10 to page 7, line 12 and

Table 3 of the English language translation provided by Applicants in the Information Disclosure Statement filed on 23 August 2003.

WO 02/41972 does not disclose the honeycomb filter having a 2 inch diameter, a length of 6 inches, a cpsi of 200, a 0.012 inch wall thickness or exhibiting one of the recited pressure drops.

WO 01/91882 teaches a similar honeycomb filter having a diameter of 2 inches, a length of 6 inches, a wall thickness of 0.012 inch and 200 cpsi in page 13, lines 32-33 and Example C1 in Table C on page 24.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the 2 inch diameter and 6 inch length of WO 01/91882 into the filter of WO 02/41972 to allow the filter to be installed in typical diesel exhaust systems. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the wall thickness and cell number of WO 01/91882 into the filter of WO 02/41972 to provide a filter having a specific collection efficiency for a given application.

With regard to the pressure drop, while WO 02/41972 is silent as to the pressure drops exhibited by the filters at different flow rates and at various stages of loading, the filters of WO 02/41972 will inherently exhibit the recited pressure drop properties since the filters of the WO 02/41972 reference are formed from the same material (cordierite) and have the same CTE, bulk filter density, median pore diameter and pore size distribution as the instantly disclosed filters.

With regard to claims 29, 32, 38, 41, 47 and 50, the prior art range for the CTE of $10 \times 10^{-7}/^{\circ}\text{C}$ or lower disclosed in WO 02/41972 is seen as overlapping the claimed ranges of less than $7 \times 10^{-7}/^{\circ}\text{C}$ and greater than $4 \times 10^{-7}/^{\circ}\text{C}$ and less than $7 \times 10^{-7}/^{\circ}\text{C}$. Therefore, a prima facie case of obviousness exists which must be overcome through a showing of unobvious or unexpected results.

Allowable Subject Matter

7. Claims 15-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

With regard to claims 15 and 16, while WO 02/41972 teaches the median pore diameter being $16\ \mu\text{m}$, the prior art made of record does not teach the filter of claim 1 wherein the median pore diameter is less than $15\ \mu\text{m}$ or less than $12\ \mu\text{m}$.

With regard to claims 17-19, the prior art made of record does not teach or fairly suggest the filter of claim 1 wherein d_{90} is less than $40\ \mu\text{m}$. Specifically, while WO 02/41972 teaches volume of pores with a size of $50\ \mu\text{m}$ or larger being 10% or less

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(including 2% or less, see Example 3) of the total pore volume, the reference does not teach or fairly suggest d_{90} being less than 40 μm .

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Merkel, Suwabe et al., Harada et al., Noda, Maier et al. and Morena et al. references disclose similar filters.


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Greene whose telephone number is (571) 272-1157. The examiner can normally be reached on Monday - Friday (9:00 AM to 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on (571) 272-1166. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jason M. Greene
Examiner
Art Unit 1724


3/3/05

jmg
March 3, 2005